

# TriMode™ Probe Family

## P7500 Series Datasheet



### Key features

- TriMode™ Probe – One setup, three measurements without adjusting probe tip connections
  - Differential
  - Single ended
  - Common mode (Requires only one probe vs. conventional probing techniques)
- Signal fidelity
  - 25 GHz P7520A (with P75PST tip)
  - 20 GHz P7520A
  - 16 GHz P7516
  - 13 GHz P7513A
  - 8 GHz P7508
  - 6 GHz P7506
  - 4 GHz P7504

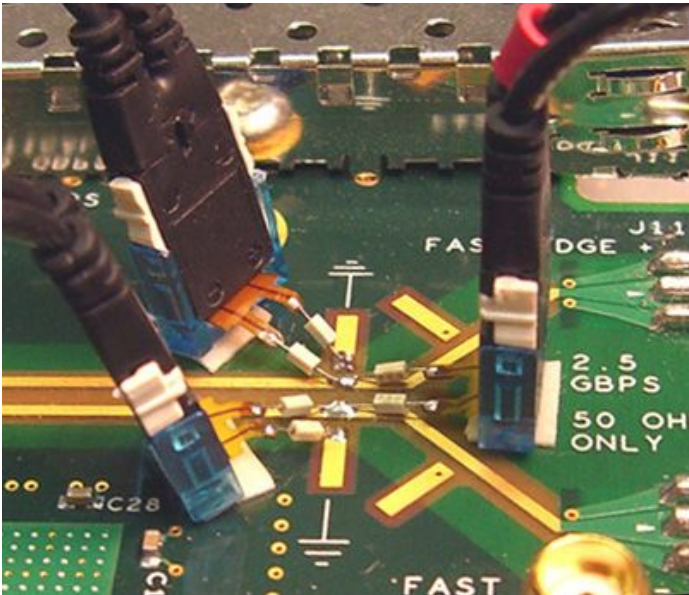
- Versatile connectivity – solder down, handheld, fixtured
  - Variety of solder-down options
    - TriMode™ solder tips
    - Small form factor for high-density probing
    - Bandwidth choices from 4 to 25 GHz
    - 1.5 m extension cable for high-temperature probing
    - Quickly and reliably connect to multiple probe tips
  - Precision Differential Probing Module – Optional handheld and fixtured probing
    - Small precision-tapered tips, an articulated joint for compliance, and variable tip spacing
- TekConnect® Interface – TekConnect scope/probe control and usability
  - Direct control from probe compensation box or from scope menu
  - Automated measurement control through the TekConnect® Interface to connect to Tektronix real-time oscilloscopes
  - View TriMode/attenuation settings on probe compensation box from top or end panel

### Applications

- Examples include, but are not limited to:
  - PCI Express, Serial ATA, DDR2/3/4, USB

## TriMode probing, connectivity, and performance

### TriMode™ Probing Architecture

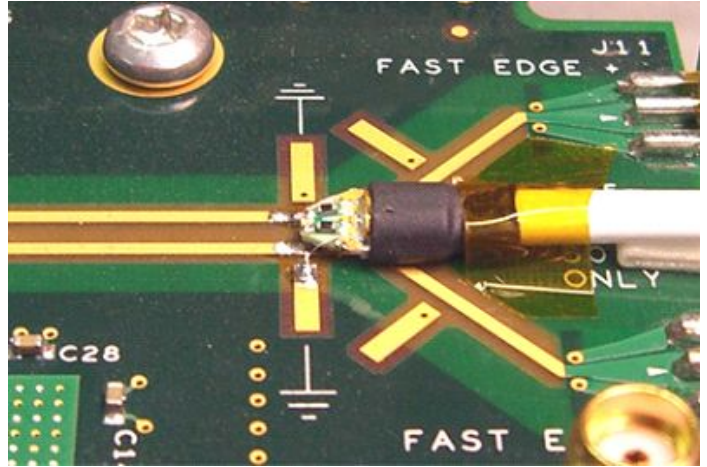


Before TriMode: 1 probe for differential; 2 probes for SE and common mode; or 1 probe soldered and resoldered 3 times; 2 probes for common mode.

One-probe setup makes differential, single ended, and common mode measurements accurately and definitively.

Tektronix is a known leader when it comes to signal fidelity and signal acquisition. Building on our history of market-leading innovations in probing, we invented a revolutionary probing architecture called “TriMode™ Probing” that defines the next-generation industry benchmark for usability and signal fidelity. This architecture changes the rules of probing and allows you to work more effectively and efficiently. By enabling unique functionality, the P7500 Series TriMode probes allow you to switch between differential, single ended, and common mode measurements without moving the probe from its connection points.

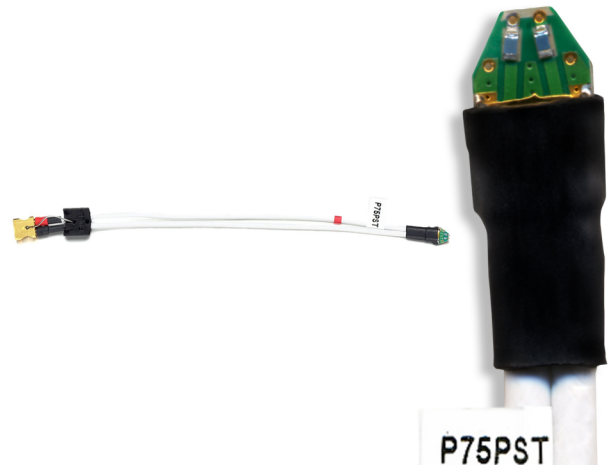
Improved productivity is achieved by reducing setup time. One setup can be used to make the three different types of measurements all with the press of a button. The TriMode Probe architecture for the P7500 Series probes continues the Tektronix tradition of high-bandwidth and low-DUT loading while providing improved connectivity and value.



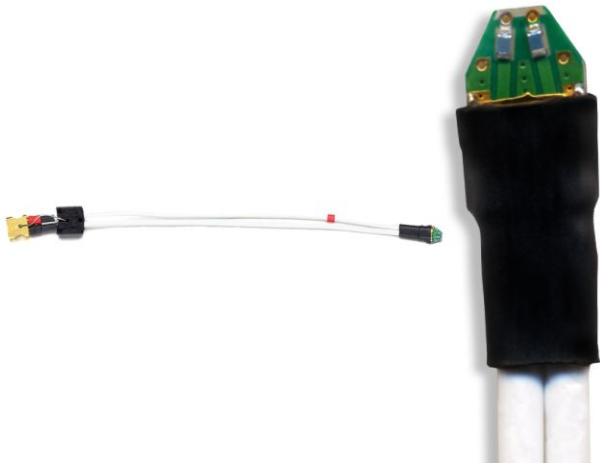
After TriMode (P75TLRST): 1 probe for differential, single ended, and common mode, with only 1 setup required.

### Connectivity Plus – Solder Down – Handheld – Fixtured

The P7500 Series TriMode probe architecture offers various levels of connectivity and provides the highest probe fidelity available for real-time oscilloscopes. The multipoint connectivity solutions of the P7500 Series include:



**TriMode Performance Solder Tip** The highest-performance solder tip. Up to 25 GHz bandwidth.



**TriMode Long-reach Solder Tip** A high performance solder tip with a long reach and very small, low-profile form factor. Up to 20 GHz bandwidth.



**TriMode Resistor Solder Tip** High-performance solder tip with easy-to-solder tip resistors. Up to 18 GHz bandwidth.



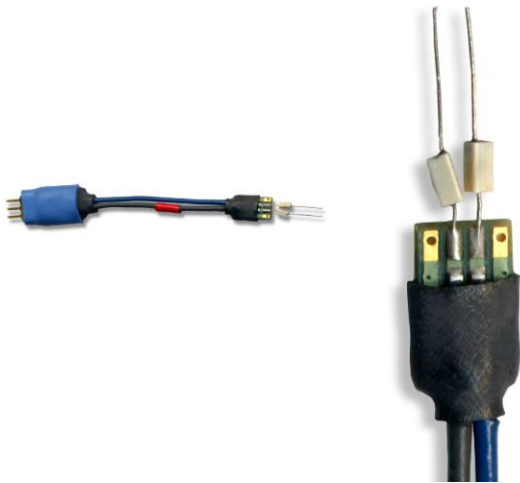
**TriMode™ Long Reach Solder Tip (75 Ω tip resistor)** A high performance solder tip for use with memory chip interposers with embedded 100 Ω resistors. Up to 20 GHz bandwidth.



**TriMode Extended-resistor Solder Tip** Medium-performance solder tip with long easy-to-solder tip resistors. Up to 7 GHz bandwidth.



**TriMode™ Long Reach Solder Tip (0 Ω tip resistor)** A high performance solder tip for use with memory chip interposers with embedded 175 Ω resistors. Up to 20 GHz bandwidth.



**TriMode Micro-coax Tip** Low-cost, quick-connect solder tips. Up to 4 GHz bandwidth.



**Damped Wire Tip** Low-cost solder tips ideal for high-density probing. Up to 8 GHz bandwidth.



**TriMode High-temperature Tip** When used with the 1.5 m Socket Cable XL, this tip can be used in environments from  $-55\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$ . Up to 10 GHz bandwidth with DSP.



**Precision Differential Probing Module** High-performance handheld probing module. Up to 18 GHz bandwidth.

Handheld and fixtured probing needs are met using the optional Precision Differential Probing Module (P75PDPM). Its small precision tapered tips, variable articulation of the probe tip, and quick-adjusting variable tip spacing provides the needed flexibility for adapting to vias and other test points of differing sizes from 30 mils to 180 mils.

These precision connectivity tools enable you to access multiple signals on anything from convenient test pads to hard-to-reach, high-density circuitry.

## Signal fidelity

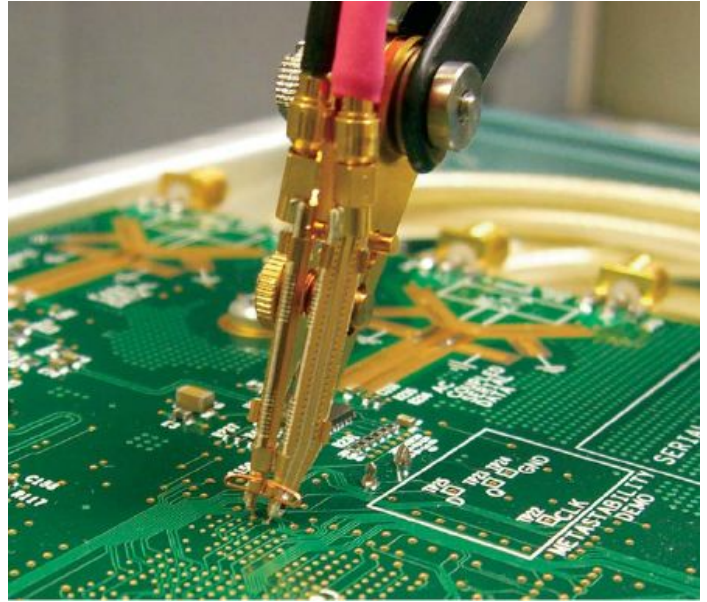
You can be confident in the signal fidelity of your measurements. The innovative new Tektronix differential architecture, coupled with the superior electrical performance of IBM SiGe technology, provides the bandwidth and fidelity to meet the industry needs of today as well as tomorrow.

The P7500 Series Probe architecture provides:

- Highest bandwidth available – 25 GHz
- Excellent step response
- Low-DUT loading
- High CMRR
- Differential, single ended, or common mode measurements using one probe

## Performance you can count on

Depend on Tektronix to provide you with performance you can count on. In addition to industry-leading service and support, this product comes backed by a one-year warranty as standard.



P7500 with P75PDPM

# Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

## Model overview

For additional characteristics, refer to the individual probe Technical Reference Manuals.

TriMode Probe Architecture	P7520A	P7516	P7513A	P7508A	P7506	P7504
Bandwidth (typical, probe only)	>20 GHz, A-B mode >18 GHz, other modes	>16 GHz	>13 GHz	>8 GHz	>6 GHz	>4 GHz
Rise time (10-90%) (typical, probe only)	<27 ps, A-B mode <29 ps, other modes	<32 ps	<40 ps	<55 ps	<75 ps	<105 ps
Rise time (20-80%) (typical, probe only)	<18 ps, A-B mode <20 ps, other modes	<24 ps	<28 ps	<35 ps	<50 ps	<70 ps
Attenuation (user selectable)	5X or 12.5X	5X or 12.5X	5X or 12.5X	5X or 12.5X	5X or 12.5X	5X or 12.5X
Differential input range	±0.625 V (5X) ±1.6 V (12.5X)	±0.75 V (5X) ±1.75 V (12.5X)	±0.75 V (5X) ±1.75 V (12.5X)	±0.75 V (5X) ±1.75 V (12.5X)	±0.75 V (5X) ±1.75 V (12.5X)	±0.75 V (5X) ±1.75 V (12.5X)
Operating voltage window	+3.7 to -2.0 V	+4.0 to -2.0 V	+4.0 to -2.0 V	+4.0 to -2.0 V	+4.0 to -2.0 V	+4.0 to -2.0 V
Offset voltage range	+2.5 to -1.5 V, A-B mode +3.4 to -1.8 V, other modes	+2.5 to -1.5 V, A-B mode +3.4 to -1.8 V, other modes	+2.5 to -1.5 V, A-B mode +3.4 to -1.8 V, other modes	+2.5 to -1.5 V, A-B mode +3.4 to -1.8 V, other modes	+2.5 to -1.5 V, A-B mode +3.4 to -1.8 V, other modes	+2.5 to -1.5 V, A-B mode +3.4 to -1.8 V, other modes
DC input resistance (differential)	100k ohms	100k ohms	100k ohms	100k ohms	100k ohms	100k ohms
Noise	<33 nV / √Hz (5X) <48 nV / √Hz (12.5X)	<33 nV / √Hz (5X) <48 nV / √Hz (12.5X)	<33 nV / √Hz (5X) <48 nV / √Hz (12.5X)	<33 nV / √Hz (5X) <48 nV / √Hz (12.5X)	<33 nV / √Hz (5X) <48 nV / √Hz (12.5X)	<33 nV / √Hz (5X) <48 nV / √Hz (12.5X)
CMRR (Differential mode)	>60 dB at DC >40 dB at 50 MHz >30 dB at 1 GHz >20 dB at 10 GHz >12 dB at 20 GHz	>60 dB at DC >40 dB at 50 MHz >30 dB at 1 GHz >20 dB at 8 GHz >15 dB at 16 GHz	>60 dB at DC >40 dB at 50 MHz >30 dB at 1 GHz >20 dB at 7 GHz >15 dB at 13 GHz	>60 dB at DC >40 dB at 50 MHz >30 dB at 1 GHz >25 dB at 4 GHz >20 dB at 8 GHz	>60 dB at DC >40 dB at 50 MHz >30 dB at 1 GHz >25 dB at 3 GHz >20 dB at 6 GHz	>60 dB at DC >40 dB at 50 MHz >30 dB at 1 GHz >28 dB at 2 GHz >25 dB at 4 GHz
Nondestructive input range	±15 V	±15 V	±15 V	±15 V	±15 V	±15 V
Interface	TekConnect™	TekConnect™	TekConnect™	TekConnect™	TekConnect™	TekConnect™
Cable length	1 meter	1 meter	1.3 meters	1.3 meters	1.3 meters	1.3 meters

## Minimum system requirements/ instrument compatibility

P7500 Series TriMode Differential Probes are compatible with the DPO/DSA/MSO70000 and TDS6000B/C Series TekConnect Oscilloscopes. The chart below shows recommended probe/oscilloscope model combinations.

Instrument	BW (scope)	FW version	Recommended probe
MSO/DPO73304DX	33 GHz	V6.4.1 or higher	P7520A
MSO/DPO72504DX	25 GHz	V6.4.1 or higher	P7520A
MSO/DPO72304DX	23 GHz	V3.0 or higher	P7520A
DPO/DSA71604	16 GHz	V3.0 or higher	P7516
DPO/DSA71254	12.5 GHz	V3.0 or higher	P7513A
DPO/DSA70804	8 GHz	V3.0 or higher	P7508
DPO/DSA70604	6 GHz	V3.0 or higher	P7506
DPO/DSA70404	4 GHz	V3.0 or higher	P7504



**Minimum system requirements/ instrument compatibility**

Instrument	BW (scope)	FW version	Recommended probe
TDS6000C	12.5 GHz, 15 GHz	V5.1.7	P7516, P7513A
TDS6000B	8 GHz, 6 GHz	V5.1.3	P7508, P7506
80A03 TekConnect Probe Interface		V2.3	All P7500 Series probes
RTPA2A TekConnect Probe Interface		V2.3	All P7500 Series probes

**Typical system specifications**

The typical system specifications in the table below are achieved using a P7520A probe with a DPO/DSA72504D or DPO/DSA73304D oscilloscope and a P75PST solder tip.

Characteristic	A-B mode	All other modes
System bandwidth	25 GHz	>18 GHz
System rise time (10% – 90%)	<20 ps	<29 ps
System rise time (20% – 80%)	<14 ps	<20 ps

## Ordering information

### Models

All Include: One-year warranty, plus see Standard Accessories table.

<b>P7520A</b>	TriMode™ Differential Probe, 20 GHz, for TekConnect Interface Oscilloscopes.
<b>P7516</b>	TriMode™ Differential Probe, 16 GHz, for TekConnect Interface Oscilloscopes.
<b>P7513A</b>	TriMode™ Differential Probe, 13 GHz, for TekConnect Interface Oscilloscopes.
<b>P7508</b>	TriMode™ Differential Probe, 8 GHz, for TekConnect Interface Oscilloscopes.
<b>P7506</b>	TriMode™ Differential Probe, 6 GHz, for TekConnect Interface Oscilloscopes.
<b>P7504</b>	TriMode™ Differential Probe, 4 GHz, for TekConnect Interface Oscilloscopes.

### Service options

Option	Description
CA1	Single Calibration or Functional Verification
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
D3	Calibration Data Report 3 Years (with Option C3)
D5	Calibration Data Report 5 Years (with Option C5)
G3	Complete Care 3 Years (includes loaner, scheduled calibration and more)
G5	Complete Care 5 Years (includes loaner, scheduled calibration and more)
R3	Repair Service 3 Years
R5	Repair Service 5 Years

### Additional service products available during warranty (DW)

Product number	Description
R3PDW	Repair service coverage 3 years (includes product warranty period). 3-year period starts at time of customer instrument purchase
R5PDW	Repair service coverage 5 years (includes product warranty period). 5-year period starts at time of customer instrument purchase



## Standard accessories

Description	P7520A/P7516	P7513A/P7508	P7506/P7504	Reorder part number
The documentation kit contains: Printed Quick Start User Manuals, CD-ROM contains PDFs of basic probe and measurement literature, and the probe manuals (Quick Start User Manual and Technical Reference Manual)	1 each <sup>1</sup>	1 each	1 each	020-2790-xx (P7516/P7513A/P7508) 020-2977-xx (P7506/P7504) 071-3048-xx (P7520A)
Antistatic Wrist Strap	1 each			006-3415-xx
Certificate of Traceable Calibration	1 each	1 each	1 each	Standard with probe
Data Calibration Report: Lists the manufacturing test results of your probe at the time of shipment and is included with every probe	1 each	1 each	1 each	Standard with probe
DC Probe Calibration Fixture	1 each			067-1821-xx
DC Probe Calibration Fixture		1 each	1 each	067-1967-xx
50 Ω Coax Cable – Male BNC to Male BNC	1 each	1 each	1 each	012-0208-xx
50 Ω Coax Cable – Male SMA to Male SMA	1 each	1 each	1 each	174-1120-xx
Solder Tip Ramps (25 each)	1 each (P7520A only)			020-3118-xx
P7520A/P7516/P7513A/P7508 Accessory Box (See contents listing below 1 through 7)				
1) TriMode Long-reach Solder Tip	2 each	2 each		P75TLRST
2) G3PO Bullet Kit (includes 4 bullets)	1 each			013-0359-xx
3) G3PO Bullet Removal Tool	1 each			003-1896-xx
4) Solder Kit: Solder Spool, Wire Spool	1 each	1 each		020-2754-xx
5) Tape, Adhesive (Strip, 10 each)	1 each	1 each		006-8237-xx
6) Marker Band Set (2 each of 5 colors)	1 each	1 each		016-0633-xx
7) Socket Cable		1 each		020-2954-xx
P7506/P7504 Accessory Box (See contents listing below 1 through 6)				
1) Socket Cable			1 each	020-2954-xx
2) TriMode Micro-coax Tip			4 each	020-2955-xx
3) TriMode High-temperature Tip			2 each	020-2958-xx
4) Solder Kit: Solder Spool, Wire Spool			1 each	020-2754-xx
5) Tape, Adhesive (Strip, 10 each)			1 each	006-8237-xx
6) Marker Band Set (2 each of 5 colors)			1 each	016-0633-xx

<sup>1</sup> P7520A documentation is a printed instruction manual.

## Optional tip accessories

Description	Part number
TriMode Performance Solder Tip	P75PST
P7500 Series Precision Differential Probing Module P7500 Precision Differential Probing Module Accessory Kit (See 1 through 7 below)	P75PDPM
1) Tip Cable (1 ps matched pair, 1 each)	P75TC
2) Probing Module Tip Probe Tips Replacement Kit 1 Each (Right and left side)	P75PMT
3) Accessory Kit; Ground Spring, Large 4 Each	016-1998-xx
4) Accessory Kit; Ground Spring, Small 4 Each	016-1999-xx
5) Handle, Adapter (Probing Module)	367-0545-xx
6) G3PO Separator Tool	003-1897-xx
7) Ground Spring Tool	003-1900-xx
TriMode Resistor Solder Tip	020-2936-xx
TriMode Extended-resistor Solder Tip	020-2944-xx
TriMode™ Long Reach Solder Tip (20 GHz, 75 Ω tip resistor)	020-3131-xx
TriMode™ Long Reach Solder Tip (20 GHz, 0 Ω tip resistor)	020-3135-xx
Resistor Replacement Kit	020-2937-xx
Solder Tip Ramps, 25 Each	020-3118-xx
Socket Cable	020-2954-xx
Socket Cable, XL	020-2960-xx
TriMode High-temperature Tip	020-2958-xx
TriMode Micro-coax Tip	020-2955-xx
Damped Wire Tip	020-2959-xx
Nexus Interposer DDR Solder Tip (4 GHz, 75 Ω tip resistor)	020-3022-xx
Deskew Fixture	067-1586-xx
Probe Positioner	PPM100
Precision, 3 Position, Probe Positioner	PPM203B
8200 Series TekConnect® Probe Interface	80A03 (FW Version ≥2.3)
RTSA Series TekConnect® Probe Interface	RTPA2A (FW Version ≥2.3)



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Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.



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